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OFFICIAL REPORT
of the
UNITED STATES DELEGATION
to the
UNITED NATIONS REGIONAL CARTOGRAPHIC CONFERENCE
FOR AFRICA
Nairobi, Kenya
July 1-13, 1963

I

BACKGROUND OF THE CONFERENCE

The United Nations Economic and Social Council by resolution 761 B (XXIX) April 21, 1960, requested the Secretary-General to "consult with the Government of the member states of the Economic Commission for Africa as well as the specialized agencies concerned and other international organizations as appropriate, on the desirability of convening a United Nations regional cartographic conference for Africa and on the place and agenda for such a conference," and "to report to the Council at its thirty-first session on the results of his consultations." These consultations indicated a wide and substantial measure of support for the holding of such a conference.

Pursuant to resolution 816 (XXXI) adopted by the Economic and Social Council on April 27, 1961, the First United Nations Regional Cartographic Conference for Africa was convened in Nairobi, Kenya, on July 1, 1963. Work of the Conference was completed and the Conference adjourned on July 12, 1963.

This United Nations Regional Cartographic Conference for Africa and those previously held for "Asia and the Far East" stem from the recommendations of the Committee of Experts on Cartography called by the Secretary-General of the United Nations in 1949. These recommendations were no doubt prompted and influenced by the success attained by the Commission on Cartography of the Pan American Institute of Geography and History in promoting and stimulating uniform mapping of standard accuracy in the Latin Americas.

The Conference opened with an address, scheduled to be given by Mr. R. K. A. Gardiner (Executive Secretary of the Economic Commission for Africa) but read by Dr. Te-Lou Tchang, Provisional President. This initial talk was primarily to stress the importance of modern cartography and to express appreciation to those governments which helped to make the Conference an actuality.

Principal speaker at the opening session was Dr. J. G. Kiano, Minister for Commerce and Industry in Kenya. At the outset Dr. Kiano welcomed the delegates on behalf of his government and emphasized the importance of the Conference at the time when so many countries in Africa were emerging from a status of colonial domination and engaging in an economic revolution which held great promise in the form of stronger purchasing power and a markedly higher standard of living for all.

The speaker then related the importance that cartographers must necessarily play in solving many of Africa's problems. Illustrating cartographic support of much needed economic measures by examples within his own experience, Dr. Kiano briefly explained the mapping program of the Survey of Kenya in which the production of large-scale maps enabled agricultural communities to benefit from a land re-allocation scheme. Further, he praised United Nations engineers who were seeking to open up new areas of irrigation agriculture, their investigation based upon a series of maps being prepared for that purpose.

In conclusion the speaker challenged the representatives of so many independent states in Africa to discuss their mutual cartographic problems as one aspect in promoting peace, prosperity, and human dignity over the continent.

II

AGENDA

The agenda as finally adopted by the Conference differed but little from a provisional agenda previously issued by the ECA Secretariat. The only change of significance was the addition of training as an agenda item. The United States, not a member of ECA, had contributed to the preparation of the provisional agenda through the United Kingdom, which is a member.

The agenda adopted at the second plenary meeting on July 1, 1963, was as follows:

1. Adoption of the rules of procedures.
2. Election of officers.
3. Report on credentials.
4. Adoption of the agenda.
5. Organization of work.
6. Review of cartographic activities in Africa.
7. Development of cartographic service.
8. Training of personnel.
9. Technical assistance.
10. Organization of international cooperation.
11. Regional projects.
12. International maps.
13. Technical questions on basic mapping
 - a) geodetic surveying
 - b) aerial photography, photogrammetry, and topographical mapping
 - c) cadastral survey
 - d) hydrographic surveying
14. Technical questions on special mapping
 - a) photo interpretation and topical mapping
 - b) atlases
 - c) other special mapping
15. Preparation and reproduction of maps and other questions related to map compilation; geographical names, etc.
16. Report of the Conference.

III

PARTICIPATION

Twenty-five countries were represented at the Conference by official delegations, 23 of which were from Africa and Madagascar and 2 from Europe:

<u>Country</u>	<u>Number of Representatives</u>
Chad	1
Congo (Leopoldville)	2
Dahomey	1
Ethiopia	4
Federation of Rhodesia and Nyasaland	1
France	4
Gabon	1
Ghana	3
Ivory Coast	1
Kenya	14
Liberia	1
Madagascar	2
Mali	1
Morocco	1
Niger	1
Nigeria	1
Senegal	1
Sierra Leone	2
Sudan	3
Tanganyika	2
Tunisia	2
Uganda	3
United Arab Republic	3
United Kingdom	2
Upper Volta	1

In addition to official delegations, nine countries--all non-African--were represented by delegations of observers. In each instance these observers represented the official governments from which they came though several were technical experts also representing commercial firms. Members of diplomatic corps were also included, and in one instance (U.S.S.R.) an interpreter. Clear-cut distinction, as among direct government agencies, quasi-government agencies, and commercial firms were not always apparent:

<u>Country</u>	<u>Official Observers</u>	<u>Observers of "National Agencies"</u>
Belgium.	2	
Canada	1	4
Germany, Federal Republic of	2	5
Israel	1	
Italy.	2	1
Netherlands.	1	1
Sweden	2	
Switzerland.	2	
Union of Soviet Socialist Republics.	4	
United States.	4	7

Eight specialized agencies, including several international organizations, sent observers to the Conference as official representatives:

<u>Organization</u>	<u>Number of Observers</u>
International Civil Aviation Organization.	1
United Nations Educational, Scientific and Cultural Organization.	2
World Meteorological Organization.	1
Commission for Technical Cooperation in Africa/ Scientific Council for Africa.	1
International Hydrographic Bureau.	1
Association of Africa Geological Surveys.	1
International Airline Navigators Council.	1

IV

UNITED STATES DELEGATION

The United States Observers' Delegation comprised four accredited members and seven who were not accredited. The latter, however, were recognized by the ECA Secretariat as official representatives of the U.S. Government agencies.

Accredited Observers:

Rear Admiral H. Arnold Karo
Director, U.S. Coast and Geodetic Survey
U.S. Department of Commerce (Chairman of Delegation)

Dr. G. Etzel Percy
The Geographer
Department of State (Alternate)

Colonel George W. Humbrecht
Chief of Surveys and Basic Data Office
Directorate for Mapping, Charting and Geodesy
Defense Intelligence Agency

Mr. Clarence G. Johnson
Assistant for Plans and Programs
Flight Information Division
Air Traffic Service
Federal Aviation Agency

Unaccredited Observers:

Dr. Meredith F. Burrill
Director, Office of Geography and Executive Secretary
Board on Geographic Names
Department of Interior

Mr. William S. Davis
Deputy Director, Technical Production Department
U.S. Naval Oceanographic Office

Mr. Philip Rahall
Assistant Director of Operations
Aeronautical Chart and Information Center

Mr. Winston Sibert
Assistant Chief, Mapping Branch
Mapping and Geodesy Division
Office of the Chief of Engineers

Unaccredited Observers: (Cont'd.)

Mr. Rupert B. Southard
Chief, Office of International Activities
Topographic Division
U.S. Geological Survey
Department of Interior

Dr. E. A. Stoneman
Geographic Attache
American Embassy, Pretoria

Captain Lawrence W. Swanson
Assistant Director for Physical Sciences
U.S. Coast and Geodetic Survey
U.S. Department of Commerce

V

ORGANIZATION OF THE CONFERENCE

In an initial Plenary Session officers for the Conference were elected, usually by unanimous approval of a single nominee. As is customary at this type of conference, the president was the head of the Survey Department of the host country.

Officers for the individual committees were selected at the outset in the first scheduled meeting of each of the four committees.

Officers of the Conference:

<u>Office</u>	<u>Office Holder</u>	<u>Representing</u>
President	Mr. D. E. Warren	Kenya
Vice-President	Mr. Ben Ghachame Selim	Tunisia
2nd Vice-President	Mr. R. J. Simpson	Ghana
Rapporteur	Mr. Diagne Daby	Senegal

Committee Officers:

COMMITTEE I

President	Mr. R. Oluwcle Coker	Nigeria
Vice-President	Mr. Traiset	Madagascar
Rapporteur	Mr. J. L. Sawyerr	Liberia

Committee Officers: (Cont'd.)

COMMITTEE II

President	Dr. A. M. Wassef	U.A.R.
Vice-President	Mr. R. Agnamey	Dahomey
Rapporteur	Mr. T. W. Skuse	Sierra Leone

COMMITTEE III

President	Mr. Bonnet-Dupeyron	France
Vice-President	Mr. W. L. Dickson	Tanganyika
Rapporteur	Mr. Mohamed Khalifa	Sudan

COMMITTEE IV

President	Mr. S. L. Okec	Uganda
Vice-President	Mr. Mahmoud Fikry	
	Halim	U.A.R.
Rapporteur	Mr. E. Tarrade	Upper Volta

Members of the United States Delegation as observers were not eligible to participate as Conference or Committee officers.

VI

WORK OF THE COMMITTEES

The four committees established by the Conference were assigned the more technical aspects of the agenda, divided into broad groups of related items. The more general parts of the agenda, such as technical cooperation and training, were retained for discussions in plenary sessions.

Summary of the Work of Committee I: (Geodesy and Hydrography)

The preponderant amount of time in the Committee's meetings concerned geodesy. Documents 19, 34, 48, 65 and 85 (see Appendix II of this report) were considered. Principal topics under discussion were the status of geodesy in Africa, satellite geodesy computations, electronic processing of geodetic data, electronic computers (their advantages versus expense), and gravity and magnetic measurements.

Discussions revolved around the various problems in Africa which handicap the establishment of an overall geodetic net. Note was made of the existing chains and networks upon which future work may be based, especially the great triangulation chain along the 30th meridian east. Another major series of discussions showed the interest of the African countries in new methods of computing and processing geodetic data and the feasibility of such techniques in the face of high costs.

Several poignant recommendations resulted from these deliberations, giving a framework for the final resolution: recommendations that:

1. . . .any national cartographic establishment to be set up in Africa should include a geodetic division.
2. . . .practical steps be taken to achieve the connections of geodetic network all over Africa.
3. . . .there should be long-range planning for geodetic control in Africa.
4. . . .a common geodetic datum for Africa be established and tied in with the existing arc of the 30th meridian.
5. . . .the modified Clark's ellipsoid of 1880 be adopted for geodetic computations.
6. . . .any central cartographic organization established in Africa be equipped with an electronic computer.
7. . . .additional points be established in Africa for geological and geophysical investigations.

In the matter of hydrographic surveying the Committee had the advantage of documents 20 and 60 (see Appendix II of this report). Pertinent discussion on any problems, however, was negligible other than securing general agreement that all maritime states should keep hydrographic information up to date.

Summary of the Work of Committee II: (Aerial photography, photogrammetry and topographical mapping; cadastral surveying)

Keynotes of the Committee's work were the problems of applying aerial surveying techniques to topographic mapping

in the African countries. It was agreed that such methods were especially pertinent in large scale mapping, including cadastral surveying. An effort is being made by the various countries to apply the most up-to-date techniques, not only because of the better results to be obtained, but to execute the work rapidly and thus stimulate economic development.

Documents 5, 8, 15, 16, 18, 26, 51, 58, 70, 74, 75, 83, 85 and 95 (see Appendix II of this report) were considered. The subject matter considered was broken down into the following topics:

- Aerial photography
- Ancillary apparatus
- Aerial triangulation
- Ground control
- Application of photogrammetry to topographical mapping
- Application of photogrammetry to large-scale mapping

Cadastral mapping fell under the last of the above topics.

Much of the detailed discussion revolved around the use of various items (super-wide angle lenses, poly-ester film base, etc.) and specific techniques in the accomplishment of basic tasks (analytical aerial triangulation, measuring distances electronically, use of electronic computers, etc.). Much opportunity was afforded the delegates for exchanging ideas based upon the experiences of individual surveyors and cartographers.

Summary of the Work of Committee III: (Topical and special maps and atlases)

The work of the Committee was largely non-technical in the sense that scientific methods and use of equipment were of secondary importance. Various types of special maps were noted and discussed, including those featuring public health, demography, meteorological, geological and soils. In addition, attention was turned to atlases, ranging from those pertaining to a single country (national atlases) to world atlases.

Emphasis was placed on the desirability of standardization in the matter of specifications and legends of maps which cut across international boundaries. Kenya voiced the advantages of national committees which could decide on priorities among various types of topical and special maps. Much of the discussion came from representatives of the Specialized Agencies, whose responsibilities encompass sub-regional (a group of countries), regional (continents) and world maps. For example,

plans by UNESCO are under consideration for the long-term project of preparing a physical atlas of the world at a uniform scale of 1:10,000,000 (160 miles to the inch).

The following documents were considered in the deliberations of the Committee: Nos. 10, 12, 13, 14, 23, 25, 29, 32, 33, 37, 40, 41, 43, 45, 51, 55, 74, 82, 92, and 94 (see Appendix II of this report).

Summary of the Work of Committee IV: (Preparation and reproduction of maps)

Discussions of members of this Committee were particularly pointed toward resolving a number of complex problems important to the making of high standard maps in African countries:

1. How to cope with the heat and high humidity, especially with regard to dimensional variation of plastics and paper for preparing and printing maps.

2. How to cut through the complications of languages, especially in African countries which have not yet achieved a unified national language, and provide a system of geographic names of standard usage.

3. How to improve photo composition of geographic names by selection and utilization of apparatus appropriate for level of the work to be done.

Documents 6, 9, 21, 35, 39, 44, and 63 (see Appendix II of this report) had been submitted on the subjects at hand for Committee IV.

NOTE: Full draft reports of the work of the four committees appear as United Nations documents, listed in Appendix II of this report.

VII

WORK OF THE CONFERENCE

The work of the Conference was divided between ten plenary sessions and individual committee meetings, the latter summarized in a preceding section of this report. The plenary sessions, including consideration of the more general aspects of the agenda may be summarized as follows:

1st Plenary Session:

Opening address (Address by Mr. R.K.A. Gardiner, Executive Secretary of the Economic Commission for Africa, read by Dr. Te-lou Tchang of the ECA Secretariat)

Adoption of the rules of procedure
Election of officers

2nd Plenary Session:

- Completion of election of officers
- Adoption of the agenda
- Organization of work
- Review of cartographic activities in Africa

The work was organized by establishing four committees to handle the more technical aspects of the Conference and scheduling the more general questions to be discussed in plenary session.

Cartographic activities in Africa were reviewed by each of the principal delegates being invited to speak on behalf of his country. Representatives of international organizations were likewise invited to report on their activities relative to Africa.

3rd Plenary Session: Development of cartographic services

The discussion centered around the projects of several countries (Ivory Coast, Senegal, Dahomey, U.A.R., and of the Office for Scientific Research in Overseas Territories (ORSTOM). A number of constructive programs are under way whereby the production of map series will be advanced. Problems of training and funding appear to be the greatest barriers to the progress which might be desired. Ample evidence was given that the French National Geographical Institute in Paris is aiding their former colonial areas.

4th Plenary Session: Development of cartographic services
(continued)

Training of personnel

The discussion was an extension of the 3rd plenary session, with Uganda, Ghana, Congo (Leopoldville), Nigeria, Sierra Leone, Tunisia, Liberia, Senegal, Ethiopia, and Madagascar participating. They contributed much information relative to progress in their countries and stressed problems which hampered their activities. The French also commented on their own problems in African cartography.

The substance of the discussions was especially revealing on two counts. First, the practical nature of cartography was emphasized--how the various programs overlap the economic needs of the countries in question. Second, problems were presented on a realistic basis so that any country might well be able to benefit from the experiences (successes and failures) of other countries.

Discussions were started on the next agenda item, the training of personnel. At the outset it was evident that views of various delegates differed widely. For example, training ranges from that of routine technical skills to that of high level supervisory functions. The former type of training requires very little expertise, and may be little more than apprenticeship under good supervision. The latter demands university type of education. Obviously the specific need of any one country may vary sharply from any norm. Also, training might be national, established at a regional center in Africa, or effected in cartographic establishments in Europe or the United States. United Nations participation in support of regional training was a consideration. Thus, the many and diverse needs of individual countries, especially in light of varying stages of development, rendered this topic a most complex one.

5th Plenary Session: Training of Personnel (continued)
Technical Assistance

The greater part of the session was devoted to concluding discussions on the training of personnel, delving into the problems suggested in the paragraph above.

The Conference next plunged into the subject of technical assistance, having Document No. 15 (see Appendix II of this report) as a reference. Principal points introduced were the need for technical assistance, and its availability--in part at least--through two United Nations sources: (1) The United Nations Expanded Programme of Technical Assistance (EPTA) and (2) a Special Fund set aside for this purpose.

6th Plenary Session: Technical Assistance (continued)
Organization of International Cooperation

Discussions on Technical Assistance acknowledged the desirability of United Nations aid, such as the establishment of an African center, and also considered sources of assistance other than through United Nations. As in the case of discussions on the training of personnel, the question arose relative to

types of assistance, e.g., importation of technical experts, or sending African cartographers abroad for the purpose of keeping current on scientific achievement in the field. Making equipment available, such as electronic computers and photogrammetric apparatus was brought out as another means of helping the African countries to advance scientifically.

A consideration of organization of international cooperation (the next agenda item) focused on exchanging information among countries and also included calling attention to those publications of benefit to more than a single country. As a special problem, the need was pointed out that any two adjacent countries need collaborate on the mapping of the area along their common boundary. Decisions on sheet lines posed other questions for discussion.

7th Plenary Session: Organization of International Cooperation
(continued)
Regional Projects

The preponderant part of this session was devoted to continuing the discussion of organization of international cooperation. Gathering information and programing its distribution appeared to be one feasible approach. Stimulating action could be national and regional committees. The Commission for Technical Cooperation in Africa is also a body advancing international cooperation, already having met to standardize map types.

There was also time in the session to quickly resolve the problems associated with Regional Projects. Certain premises were identified whereby regional projects could progress with the cooperation of all or a part of the African nations. The discussion in general was abstract.

NOTE: This subject along with those of training of personnel, Technical Assistance and Organization of International Cooperation had much in common one with another in the work of the Conference. For example, training in one way or another was involved in all four topics.

8th Plenary Session: International Maps
Report on Credentials
Report of the Conference
Organization of International
Cooperation (continued)

Discussions on international maps were limited to the International Map of the World and World Aeronautical Charts. In the first instance, a resume was given on the United Nations Technical Conference on the International Map of the World on the Millionth Scale held at Bonn in August 1962. Progress on the project since that time was given with reference to participation in and advantages for African countries.

With respect to aeronautical charts, wholehearted participation by the African countries was recommended by the International Civil Aviation Organization. Problems of production, including the complexities of sheet lines of individual countries, was discussed by the French delegate from the Institute Geographique National.

The Report on Credentials and Report of the Conference were handled without complications.

The Session continued with attention again turned to the Organization of International Cooperation. The principal activity at this time was drafting suitable resolutions.

9th Plenary Session: Draft Resolutions for adoption by the Conference (See complete list of resolutions, starting on page 16 of this report)

10th Plenary Session: Continuation of draft resolutions as above.
Reports of the Committees
Final Report of the Conference (Document 99 and Correction 1, as listed in Appendix II of this report)
Closure of the Session

In the closure the United States Observer expressed his appreciation and that of the other observers of the welcome they had received as participants in the Conference. He looked forward to meeting the representatives on future occasions.

RESOLUTIONS

The work of the Conference resulted in 22 resolutions, the majority stemming from the discussions and recommendations of the Plenary Sessions. Committee work was obviously reflected

in all of the resolutions, but only five were basically generated in a Committee: those concerning geodetic networks, common geodetic datum, topical maps, hydrographic services, and geographic names.

The resolutions as finally adopted by the Conference are as follows:

Regional Cooperation	4	resolutions
Technical Assistance	2	"
Organization of Cartographic Services.	3	"
Training of Personnel.	2	"
Regional Project	1	"
Exchange of Information.	3	"
Geodesy.	2	"
Production of Special Mapping.	2	"
Geographic Names	1	"
Votes of Thanks.	2	"

1. SECOND UNITED NATIONS REGIONAL CARTOGRAPHIC CONFERENCE FOR AFRICA

The Conference,

Considering the usefulness and importance of regional cartographic conferences for Africa,

Noting that it is in the interest of African countries to meet periodically to assess the progress made and devise together appropriate measures concerning their future action,

Noting further that in the present Conference technical papers submitted by delegates and observers were not available until the Conference had assembled, that some papers were even published during the second week of the Conference, and that delegates had insufficient time to study these papers,

1. Recommends that the Economic Commission for Africa should convene a second United Nations regional cartographic conference for Africa not later than 1966;
2. Recommends the insertion in the provisional agenda of an item worded as follows: "Report of the organizations concerned on progress made in fields covered by resolutions or recommendations at the last Conference;"

3. Recommends further that in any future conference, technical papers should be circulated to all delegates so as to reach them at least one month before the opening of the conference, and that during the conference papers concerned solely with the administration and business of the conference should be circulated.

2. REGIONAL COOPERATION

The Conference,

Realizing the necessity for regular consultations and constant review of progress made in the planning and organization of cartographic services in Africa,

Realizing further the problems involved in organizing frequent regional cartographic conferences in Africa,

Recommends that ECA should assist in the organization of sub-regional conferences.

3. RELATIONSHIP BETWEEN ECA AND CCTA

The Conference,

Considering point VI of the final resolutions adopted by the Heads of African States in Addis Ababa concerning the maintenance of the Commission for Technical Co-operation in Africa (CCTA) with a view to its incorporation at a later stage in an organization for technical, scientific and cultural cooperation,

- Considering moreover that the CCTA Inter-African Map Committee has rendered and is continuing to render valuable services to numerous African countries as regards cartographic cooperation,

Noting that the Executive Secretary of the Economic Commission for Africa and the Secretaries-General of CCTA and of the African and Malagasy Organization for Economic Cooperation (OAMCE) have met to discuss the coordination of their activities,

Recommends that the Cartographic Unit of ECA and the Inter-African Map Committee of CCTA should continue to discuss

with each other questions relating to cartography so as to coordinate their own activities and thus increase their efficiency while avoiding overlapping in this sector.

4. ORGANIZATION OF INTERNATIONAL COOPERATION

The Conference,

Having studied resolution 600(XXI) of the Economic and Social Council concerning the question of the establishment of cartographic committees by the regional economic commissions,

Noting that:

- (a) The Conference has adopted resolutions requesting ECA to carry out certain preliminary work relating to future cartographic activities in Africa,
- (b) The secretariat of ECA has already set up a cartographic unit to deal with regional cooperation in cartography,
- (c) A second cartographic conference for Africa has been recommended to be held in 1966,

Recommends that ECA defer the consideration of the above-mentioned resolution until the second regional cartographic conference for Africa has studied it again in the light of the progress achieved in the implementation of the recommendations of the present Conference.

5. REQUESTS FOR TECHNICAL ASSISTANCE

The Conference,

Taking into account the fact that the majority of African countries are in process of development,

Aware of the fact that in view of their present state the national cartographic services of the region would be enabled with the technical assistance of the United Nations to make more rapid progress,

Requests the Technical Assistance of the United Nations (including the Special Fund):

- (a) To ensure that the requests for technical assistance addressed to the United Nations receive favorable replies as early as possible;
- (b) To accord priority to requests for the establishment, development or modernization of the national cartographic services;
- (c) To accord financial assistance to the countries of the region so as to enable them to participate in regional meetings on cartography.

6. TECHNICAL ASSISTANCE REQUIREMENTS

The Conference,

NOTING:

- (a) That the technical assistance provided through international channels and by bilateral agreements has played an important role in the strengthening of certain national cartographic services and in the carrying out of certain cartographic projects,
- (b) That the necessary means to increase the technical capacity of national cartographic services of the developing countries cannot be met by their national resources alone,
- (c) That the technical assistance required by the cartographic services of the African countries are not yet known in full to all the organizations and governments providing such assistance,

Considering that adequate information on these requirements would increase the usefulness and efficiency of technical assistance in the various branches of cartography.

Recommends that the Executive Secretary of ECA should collect from the national cartographic services information on their technical assistance requirements and make it available on request to the organizations and governments having technical assistance programmes for Africa.

7. ORGANIZATION OF CARTOGRAPHIC SERVICES

The Conference,

Convinced that no country which aspires to rational economic development can long neglect the complete inventory of its resources,

Recommends that governments of countries of the region which do not yet possess a national cartographic service set up such a service, and establish, parallel with that service, a national mapping committee which shall be responsible for the coordination of cartographic programs.

8. CENTRALIZATION OF CARTOGRAPHIC INSTITUTIONS

The Conference,

Having noted that the setting up of two or more isolated cartographic service institutions in one country might:

- (a) Involve a tremendous waste of capital and effort in the form of duplication of work, personnel, equipment, etc.,
- (b) Render the setting up of standardized procedures impossible,

Recommends that member States take the necessary steps to centralize their cartographic service institutions as much as is practicable.

9. HYDROGRAPHIC SERVICES

The Conference,

Convinced of the great importance of timely hydrographic data for the safe navigation of ships and for furthering the economic development of the marine resources,

Considering that most of the African countries have not yet established national hydrographic services,

Invites the governments of the African maritime countries to consider the establishment of national hydrographic services and to join the International Hydrographic Bureau.

10. TRAINING OF PERSONNEL

The Conference,

Having noted that:

- (a) Technical training in certain cartographic fields is urgently required in many African countries,
- (b) The ECA has included in its high-priority projects the task of undertaking preparations for the setting up of a regional center for the interpretation of aerial surveys and another for training in photogrammetry and airborne geophysical prospecting,

Recommends that:

1. In the first stage of the preparatory work, the views and proposals of the national cartographic services should be obtained;
2. The ECA call a small group of experts to study these proposals and to make practical recommendations regarding the project before the end of 1964.

11. TRAINING FACILITIES

The Conference,

Having agreed that the provision of new, and expansion of existing, training facilities for both technicians and professional officers in the fields of cartography and surveying in Africa are matters of fundamental importance and high priority,

Recommends that ECA should collect from member governments full information on the existing facilities for such training presently available in Africa, including details of:

- (a) Situation of training establishments;
- (b) Language(s) of instructions;
- (c) Courses available;
- (d) Fees;
- (e) Whether students from other African countries may enroll;

(f) Numbers of students at present enrolled;

(g) Qualifications of teaching staff;

and make this information available to all member governments.

12. REGIONAL PROJECT

The Conference,

Having reviewed the reports on cartographic activities in Africa,

Noting that:

- (a) Important work has been accomplished and valuable experience procured.
- (b) Further urgent cartographic work is needed to meet the requirements of the United Nations Development Decade and to fulfill the aspirations of the African countries for rapid economic development and social progress,
- (c) Certain phases of this work require complex and expensive equipment and up-to-date technical knowledge which are not available in many African countries,

Recommends that the Executive Secretary of the Economic Commission for Africa consult the governments of the African countries on the question of establishing joint centers for specialized services on a regional or sub-regional basis and to report the results of these consultations at an early session of the Economic Commission for Africa.

13. EXCHANGE OF INFORMATION

The Conference,

Convinced of the usefulness of disseminating cartographic documents and publications and exchanging information on the subject,

Recommends that African governments take the necessary steps to promote the exchange of cartographic documents and publications.

14. EXCHANGE OF TYPICAL SHEETS

The Conference,

Noting that the exchange between countries of typical maps of current and future series would serve a beneficial purpose,

Recommends that all countries in Africa should send to all other countries one typical sheet of series existing at present and, in the future, one typical sheet of any new series.

15. BIBLIOGRAPHY

The Conference,

Noting that a need exists for the distribution of information regarding publications on surveying and cartography,

Recommends that the Economic Commission for Africa should from time to time prepare a bibliography of recent important publications on cartography and surveying and distribute it to the member countries.

16. CONNECTION OF GEODETIC NETWORKS

The Conference,

Noting that several connections of geodetic networks and precise levelling have not been achieved,

Considering the great advantage of making an overall adjustment of the African nets which are based on independent reference data,

Recalling the great international scientific value of these junctions,

Recommends that the countries of the region should take the necessary steps to effect the said connections.

17. COMMON GEODETIC DATUM

The Conference,

Recognizing:

- (a) The need for a common geodetic datum throughout Africa,
- (b) The differing stages of development of geodetic control in the African countries,
- (c) That the adjusted arc of the 30th meridian exists and extends from the extreme north to the extreme south of the African continent,

Noting that the modified Clarke 1880 figure of the earth is already the most widely used in Africa,

Recommends that:

1. All countries should agree to work towards the establishment of a common geodetic datum;
2. The datum should be the already existing and adjusted arc of the 30th meridian;
3. The link from the arc into West Africa should be completed at an early date;
4. Countries in Africa should consider the advantages of adopting the modified Clarke 1880 figure for geodetic surveys.

18. COOPERATION BETWEEN SPECIALISTS IN AND PRODUCERS OF TOPICAL MAPS

The Conference,

Stressing the scientific and technical difficulties which characterize the preparation and publication of most topical maps,

Noting that in the absence of technicians competent in the preparation and production of maps, it is impossible to produce topical maps of scientific worth and practical use,

Recommends that local, international or regional mapping committees should be attended simultaneously by specialists responsible for the preparation and production of topical data and by cartographers responsible for the graphic transposition of those data.

19. INTERNATIONAL MAPS

The Conference,

Taking into account the fact that almost all African countries are members of the International Civil Aviation Organization (ICAO),

Aware of the fact that:

- (a) Many of the specified types of aeronautical charts for the African continent have not yet been published,
- (b) Some of the existing aeronautical charts need revision,

Recommends that the respective survey departments and departments of civil aviation of the governments of the countries of this continent take the necessary steps to complete and revise their aeronautical charts.

20. GEOGRAPHICAL NAMES

The Conference,

Considering the relevance of the name specifications for the International Map of the World on the scale 1:1,000,000 (IMW) adopted at Bonn in 1962,

Recognizing the need for parallel programmes for cartography and toponymy,

Noting that the Economic and Social Council is considering the calling of an international conference on geographical name standardization as recommended in the Report of the Group of Experts on Geographical Names which it convened in 1960,

Recommends that:

1. The cartographic services in African countries take account of the name specifications for the IMW and apply them, where appropriate, to maps of other scales;
2. African governments, in standardizing the written forms of their own geographical names, provide such information and take such steps recommended in the report of the Group of Experts in order to facilitate the use of these names by other countries;

3. The African countries indicate their intention to participate in the proposed international conference on standardization of geographical names now under consideration by the Economic and Social Council.

21. VOTE OF THANKS

The Conference,

Expresses its heartfelt thanks to the Government of Kenya for the excellent arrangements it has been so good as to provide for the organization of the first United Nations Regional Cartographic Conference for Africa and for the hospitality afforded to the participants.

22. VOTE OF THANKS TO THE ECONOMIC COMMISSION FOR AFRICA

The Conference,

Aware of the amount of work involved in preparing and organizing the Conference and in providing the necessary secretariat,

Thanks the Economic Commission for Africa for having put at the disposal of the Conference the facilities and staff which have enabled it to carry out its work under the most favorable conditions.

VIII

FUTURE MEETINGS

A resolution was adopted by the Conference to the effect that a second United Nations Regional Cartographic Conference should be held not later than 1966. If carried out, the schedule implied would conform to the series of United Nations Regional Conferences held for Asia and the Far East in 1955, 1958, 1961, and one slated for 1964.

Some recommendations were made for future meetings of representatives of the African countries on specific projects, but no times were definitely arranged.

IX

CONCLUSIONS

With few exceptions the U.S. Observers had a live interest in the various topics under discussion in the Plenary Sessions and the Committees. As observers, rather than member-delegates, the American team did not participate to the extent possible in the somewhat similar United Nations Regional Cartographic Conference for Asia and the Far East in which the United States is a member country. Nevertheless, observers were freely invited to speak from the floor on any points concerned with cartographic as opposed to administrative matters. American representatives spoke with moderate frequency, especially on geodetic work, aerial surveys, and geographic names.

The work of the Conference, as related to United States interests is summarized below by major subjects. In a number of instances these subjects cut across the limits of agenda items, consequently their consideration in terms of subject matter best states the American point of view, appraisal, and conclusions. The order of presentation, however, approximates the sequence given in the agenda.

Training of Personnel:

The matter of training was seriously considered by most delegates as an acute problem and as an immediate requirement, especially for the newly emerging nations. Although the topic had not appeared on the provisional agenda, it was introduced into the final agenda and discussed at some length in the 4th Plenary Session.

It was early evident that any program to establish training facilities suitable to all African countries would be fraught with problems. Primary discussion brought out that more than a single level of training was needed. One could distinguish basic technical training as being distinct from that needed for supervisory grades--that found at university level in the more developed countries. Also a special need was noted for training in the more modern techniques involving operation of new scientific equipment constantly appearing in survey establishments.

Another problem evident to the U.S. Observers was how existing training facilities and opportunities could be utilized in any program which might be initiated. Some delegates announced that they were already giving priorities to training; others had provisions for trainees to study in European countries, as at the Institute Geographique National in Paris.

Still another problem entailed the matter of location, Which elements of training should be retained by individual countries? Which elements need be centered in universities or training institutions in Europe or the United States? Some discussion centered on possibilities of a training center for all of Africa and regional centers for parts of the continent although very little in the way of clear-cut procedure evolved in this direction. The most acceptable view taken toward a solution of this problem was that the United Nations establish or in some way sponsor a center for the training of Africans in the various branches of cartography.

Two of the Conference Resolutions quite appropriately penetrated the maze of problems at hand and offer at least a start for the consideration of training and staffing African survey establishments (Resolutions Nos. 10 and 11 as previously listed in this report).

Technical Assistance:

Most if not all of the African countries are in need of technical assistance of one type or another. The degree of need represents the inability of any national survey organization to finance a schedule of technical operations or fund for the necessary equipment. Three sources of technical assistance to fill this lack were at once apparent: (1) the program of the Directorate of Overseas Surveys which facilitates mapping in the African areas of British interests; (2) the Institute Geographique National of Paris which works closely with African areas of strong French influence; and (3) the United Nations which is in a position to provide aid to African countries. Weighed against these potential advantages were comments from the floor to the effect that each country should strive to rely on its own resources as far as possible to effect a satisfactory mapping program.

Details brought out concerning specific needs included technical expertise (either imported or foreign training), availability of modern equipment, and central or regional centers of information. Three types of assistance enumerated by the Executive Secretary suggested means of implementing the aid: (1) supply of experts to help governments in planning and carrying out their programs; (2) granting of fellowships and scholarships for study abroad; and (3) supply of equipment for training purposes.

United States Observers, though not participating in the discussions other than about scientific techniques per se, were particularly interested in this subject. American mapping agencies have frequently played host to foreign surveyors and cartographers, including a number from the African countries. Periods of familiarization and training have ranged from brief orientation visits to those lasting many months. AID (formerly MSA and ECA) programs include attention to mapping needs in the less developed countries. At the moment a cadastral program in Morocco and a topographical mapping project in Ethiopia are under way.

International Cooperation:

A framework for international cooperation in cartographic work in Africa does exist, although there is strong evidence that much more cognizance need be taken to make full and beneficial use of such opportunities. Seldom can national mapping stop sharp at an international boundary. Aerial photography of neighboring states must necessarily merge and overlap. Likewise, symbolization and scales need standardization among countries for success in regional mapping projects.

Progress in international cooperation to date sounds impressive and may well be a harbinger to the advancement possible in the years to come. The Commission for Technical Cooperation in Africa (CCTA/CSA) listed several achievements in the direction of international cooperation: Agreement to use the modified Clarke Ellipsoid of 1880; adoption of the UTM grid; adoption of the INW sheetline system; some basic policies in the use of geographical names; and the establishment of a permanent committee of cartographic experts to maintain liaison on common problems and assure the exchange of reports, programs, and technical information. There remains some questions, however, as to the degree of actual cooperation practiced within these

provisions. At least the voicing of a need for more international cooperation by a number of the delegates indicates a live interest in pursuing this avenue further.

The United Nations Economic and Social Council at its 21st Session adopted a resolution which recognized the importance of accurate and reliable cartographic information and recommended that regional economic commissions consider the question of establishing cartographic committees for the purpose of periodic consultation among members. However, the Secretariat reminded the delegates of the Conference that the Economic Commission for Africa has not yet considered this question.

Actual realization of the advantages of international cooperation need not always require official documentation sanctioned in the higher governmental echelons. Exchanges of base maps between two neighboring states; agreements on scales; examination of proofs; and other examples of technical consultation and exchange at a working level exemplify a type of international cooperation which is practical and assure good results.

Regional Projects:

This subject proved to be somewhat subservient to others, since it involves training, technical assistance, international cooperation and specialized mapping and mapping methods. It was discussed in the abstract, that is, without direct reference to projects involving specific data.

Previously (in Leopoldville early in 1963) an ECA sponsored meeting had called for the establishment of two regional centers, one for the interpretation of aerial surveys and one for training in photogrammetry and airborne geophysical prospecting. Such centers, it was purported, would carry forward national programs to study and exploit natural resources and in addition provide a basis for economic and social projects such as urban and rural development, land resettlement, road and railroad construction, improvement of air and sea navigation and agricultural development.

Discussion in the Plenary Session hinged on the premises of establishing these regional centers, emphasizing the fact that two, not one, center would be required for optima results.

International Maps:

Despite the broad views generally prevailing in this Conference, international maps in the sense of world-wide, uniform series received but little attention. Only two papers on international maps were presented, both in Plenary Session rather than in a technical committee meeting. One of the papers concerned the International Map of the World (IMW) and the other International Civil Aviation Organization (ICAO) maps (U.N. Documents Nos. 50 and 52 as listed in Appendix II of this report).

Lack of discussion on the IMW probably resulted because none of the delegates had been in attendance at the Bonn Conference in 1962 which convened for three weeks on this topic, nor had the United Nations Report on it yet been published. However, the idea was introduced that observing the standard IMW sheet lines might prove to be a handicap for the African countries, taxing their cartographic resources. For example, in one country six sheets are required for full coverage according to the IMW sheet layout when by flexible alignment of sheet lines only two sheets would be necessary. Sheet lines will be a problem, of course, if the nations cooperate in the spirit of the IMW in sharing the production of the IMW coverage for Africa. A real opportunity was presented here for the formulation of an international program but the matter proceeded no further than as an observation. Unfortunately no resolutions or recommendations regarding the IMW --other than on geographical names--were introduced. Any future U.S. delegation having the opportunity to do so should be prepared to stimulate progress on the International Map of the World at the Millionth Scale.

Similarly, attention given to widespread coverage of aeronautical charts lacked urgency. The paper on the subject described the function of ICAO in developing international standards and recommended practices in the field of aeronautical charting. It called attention to the obligations of contracting states of ICAO (of which most African States are members), under its conventions, to provide civil aviation with several specific types of charts. Further, it suggested that the Conference make every effort to meet the existing requirements and offered the advice and assistance of ICA Regional Offices in Cairo and Dakar. The record does not show progress in all quarters. The observer from ICAO pressed the matter somewhat, urging that the respective departments of cartography and departments of civil aviation in African countries make

detailed working arrangements to produce the surveys and charts required for safe and efficient air navigation. The United States prepared a draft resolution calling for advancement in aeronautical charting and which with conservative modification was introduced into the Conference by Sierra Leone.

Geodesy:

The initial issue centered on the decision as to whether an overall African geodetic network would or would not be justified. Several delegates stated that the need for routine mapping programs in their countries was so pressing that long-range geodetic planning which extended beyond their boundaries should be given low priorities. Later on some headway was made in distinguishing between short-range and long-range programs and recommendations offered so that at least a schedule of international geodesy could be adopted when feasible.

The United States presented a paper on geodesy which stimulated direct questions and comments to specific points. For example, the paper brought out differences of opinion as to whether the Clark 1880 ellipsoid should be used to base the geodetic computations of surveys which are to be made in the future in Africa. After long discussions in the first, second, and third meetings of the Committee the recommendation was made to "reaffirm the recommendations of the Commission for Technical Cooperation in Africa (CCTA/CSA) Conference in Bukavu that the Modified Clark's ellipsoid of 1880 should be adopted for geodetic computations." Nevertheless, the recommendation was based on the fact that this base has been used for the geodetic computations of most surveys in Africa made to the present date and that it should continue to be used until there is sufficient information to determine an ellipsoid that is nearer the correct size and shape of the earth.

The United States suggested that trilateration could be done with the new system being developed by the Department of Defense from aircraft (discussed later under "Aerial Photography"). In similar vein Canada suggested that AERODIST equipment be used for mapping at scales of 1:50,000, 1:100,000, etc.

The United States noted that resolutions recommending that "Governments of countries of the region which do not yet possess a national cartographic service set up such a service and establish parallel with that service a mapping committee which shall be responsible for the co-ordination of cartographic programs." It was further noted that if such services were to

be set up in each country, that it also be complemented by a Division of Geodesy where long-range planning could be co-ordinated with immediate planning, so that the two control systems could be integrated into one geodetic datum.

After continued discussion this item appeared as a modified Committee recommendation: "During the discussion the Committee noted the importance of geodetic control as the basis for accurate large and medium scale mapping and decided to recommend that any national cartographic establishment to be set up in Africa should include a geodetic division." However, "The Committee saw the need for a common geodetic datum all over Africa and decided to recommend further that all countries should agree to work toward the establishment of a common geodetic datum based on the arc of the 30th meridian." Thus by inference the principle was accepted to carry on with geodetic programs with an aim to establish one datum for Africa.

Little attention was given to leveling in Africa other than noting that all countries reporting had made some advance in this direction, and that it would be desirable to have the various leveling nets inter connected and eventually adjusted into a single level datum based on mean sea level. Some difference was expressed as to which term was the more suitable for this work: "geodetic" or "precise leveling."

The subject of electronic distance measuring instruments created some interest, especially as to the degree of accuracy possible. It was agreed that their use should be continued for both traverse and trilateration. Only the Tellurometer had been introduced into Africa to any extent.

The U.S. Observers were gratified to note the constructive tone of discussions on the various aspects of geodesy, finding a receptive attitude toward scientific advancement and international cooperation despite a preliminary view towards getting on with the work in hand irrespective of desirable long-run potentials.

Aerial Photography:

The most serious problem facing the African nations in their efforts to acquire accurate topographic maps is the lack of aerial photography together with inadequate geodetic control.

The continent of Africa, which is nearly four times the size of the United States, has a dearth of aircraft available for air photography. Some of the new nations have no such aircraft whatsoever, while those that are so fortunate cannot commit their limited aerial resources exclusively for the purpose of taking air photos. In addition any sustained aerial photography programs are seriously curtailed by extensive maintenance and a lack of replacement parts. Operational capability of the aircraft is likewise restricted to the medium altitudes (maximum, 25,000 feet) with poor performance characteristics such as limited range and endurance.

A prevailing policy is to use aircraft on a priority or minimum time allocation basis. Sharing aircraft for transport, cargo, and other uses besides photo work thus further complicates the problem for the cartographers. One alternate to this and other dilemmas is to contract for the needed aerial photography. An obvious drawback to such procedure, however, is the excessive costs for extensive coverage by such means.

A majority of the aerial photography in the new African states has been provided by the British and French governments through commercial contracts or government-owned survey aircraft. As the influence of these governments on the new countries wanes, the support for aerial mapping and surveying will diminish in like proportion.

Aerial photography accomplished to date in the African continent has included the use of the normal cartographic mapping cameras. Some use has been made of stabilized camera mounts (a necessity for modern map compilation except in extremely stable aircraft) and limited use of the airborne profile recorder (APR) to provide a tracing of terrain elevations for vertical geodetic control. The extensive and persistent haze in much of the expansive unmapped African areas has seriously curtailed the very limited aerial mapping efforts. To overcome the above problem, use of various methods of airborne control has been employed (e.g., Decca, Shoran) to attempt to guide the aircraft over the photographic flight path.

The equipment mentioned above--particularly the stabilized camera mount, the airborne profile recorder and the airborne electronic control devices--comprise sensitive precision units. Their use overtaxes the ability of the new African countries to maintain. The nations have appealed to the United Nations for technicians to assist them in their overwhelming problems.

Discussion in the Conference brought out the fact that the acquisition of geodetic data by ground survey parties is not possible over much of the African landscape. This handicap, among others, led the United States to propose a system for the airborne acquisition of the needed geodetic control data. The Soviet Union also made a proposal purported to attain the same objective.

The U.S. mapping system under development (RC-135 aircraft --USQ 28 and USQ 32 systems) was explained to the Conference delegates and their attention directed to the fact that this system was planned to overcome the present difficulties of map data acquisition. The U.S. system is capable of acquiring all data necessary for map compilation with a minimum of effort. The installation of widely separated ground stations (several hundred miles one from another) will be the only requirement for establishing the necessary geodetic control data. The African nations displayed much interest in the U.S. system and discussed it at considerable length between the regular conference sessions. A request for distribution copies of the paper on the U.S. system was made through the ECA Secretariat.

The mapping system proposed by the Soviet Union was evaluated by the U.S. Observers. In resume, it could have a strong appeal to the African nations which are desperately seeking ways and means for mapping and survey assistance. Technically, however, the Soviet system entails cumbersome methods and would require considerable supplemental ground control to satisfy map data requirements. The technical equipment required to support this proposed system could in effect only be operated and maintained by a large contingent of Soviet technical specialists.

Lack of meteorological data throughout Africa was discussed by the delegates as a serious obstacle to the aerial mapping efforts. Cloud cover in particular cannot be known or predicted over large areas. The U.S. Observers informed the Conference delegates that the meteorological satellites could be a useful device to the aerial mapping efforts and that data from it would be available from it to any nation that possessed a tracking facsimile receiver (cost in the United States: \$30,000). A request for distribution copies of the paper being prepared on this subject was made through the ECA Secretariat.

In summary, it can be concluded that:

1. The African nations have within their borders very limited resources for aerial mapping and insufficient technicians to maintain this equipment.
2. The African nations will at the outset be hard pressed for sufficient aerial photography and geodetic control.
3. The mapping system proposed by the Soviet Union (which presumably is available) could have a strong appeal to the nations in desperate need of map data.
4. The existing U.S. HIRAN system is at least equivalent to and likely better than the newly proposed Soviet system.
5. The U.S. system could provide aerial photography and airborne electronic control to satisfy most requirements for the African nations for such data for basic standard mapping if and when applied.

In the light of these conclusions, the U.S. Observers recommend that the United States provide, within its capability, aerial photographic and geodetic survey support for the African nations.

Photogrammetry and Photogrammetric Mapping:

The general subject of photogrammetry as considered in Committee II embraced several aspects of the field: special aerial photography, airborne profile recorder data, photogrammetry, and topographical mapping. Discussion enabled the U.S. Observers to obtain a fairly reliable impression as to the current situation in this specialized but key field. The following paragraphs summarize several of these findings.

Several delegates indicated experience with the use of infra-red photography for special purpose applications. Nigeria in particular mentioned a large project which was completed by use of such photography under contract to a Canadian air survey company. Ground haze conditions had prevented attempts to obtain photography with the use of conventional mapping film.

The RC-8 mapping camera is in general use throughout the survey offices of African nations, though discussion on the subject of aerial mapping photography remained at a minimum

because of the dearth of suitable aircraft by a number of the smaller and lesser developed countries (see text under "Aerial Photography," immediately preceding this section).

A general discussion on the use of the Airborne Profile Recorder (APR) data indicated a common desire to make use of such techniques. The delegate from France spoke of the experience which the Institute Geographique National (IGN) had in the Sahara regions. Here accuracies of plus or minus three to four meters have been attained. Equivalent accuracy has not been obtained in the heavily foliated area of Africa, particularly in the equatorial region. IGN is presently studying the problems attendant with APR operations in densely vegetated areas and hopes to resolve these technical problems in the near future.

The discussion on camera stabilization varied greatly in regards to accuracies required and those obtained. For example, the United Arab Republic delegate stated that his experience with stabilized mounts indicated that a plus or minus 40-minute deflection from the vertical accuracy could be reliably obtained. The delegate from Gabon stated that his organization had been able to consistently stabilize the aircraft to an accuracy of plus or minus one degree from the vertical and because such accuracy was sufficient there was no reason to stabilize the camera. In light of these and other statements a U.S. Observer informed the Conference of a new development in camera mount stabilization whereby a 90-percent dependability of recording the vertical deflection with an accuracy of plus or minus 30 seconds would be realized. The feasibility of 30-second vertical accuracy evoked considerable discussion and interest.

Standard photogrammetric techniques for large and medium scale mapping are in general use throughout the map-producing agencies of the various countries of Africa. The degree of capability, however, varies greatly with many of the lesser developed countries having extremely limited capacity to obtain mapping photography, geodetic, and mapping control, or to accomplish stereo-triangulation. Many countries indicated an interest in analytical triangulation but lack of resources to develop computer facilities proves to be a major element of frustration in realizing such capabilities.

The subject of small-scale mapping and the development of special photogrammetric techniques and equipment especially for this type of mapping evoked but limited discussion. In

this connection, the primary concern of each nation is the rapid completion of initial editions of large-scale maps and cadastral mapping as required, from which maps at reduced scales can follow. The delegate from the Soviet Union suggested that the only essential requirement to accomplish small-scale mapping with existing photogrammetric techniques is the special tailoring of geodetic operations. The United States concurs with this suggestion with the exception that inasmuch as practical, small-scale publications should be accomplished by extraction of data from large-scale maps.

Cadastral Mapping:

Cadastral surveying and mapping constitutes a primary problem for all African nations engaged in programs of city planning, land consolidation, land registry, tax structuring, etc. Because of this interest, photogrammetric techniques for large-scale map production are of more than routine interest and have been employed whenever possible. Although all delegates discussing the problem acknowledged the advantages that photogrammetry offers to speed up such programs, they also recognize a common problem, i.e., that of photo-image identification. Land holdings of Africans are notoriously unmarked by fence lines, walls, hedges, or other identifiable linear objects. Considerable discussion focused on the various techniques being employed to distinguish one land holding from another, such as digging furrows and planting hedge rows prior to the actual aerial photography.

On the afternoon of July 9, the delegates and observers were taken to Kiambu, a few miles north of Nairobi, to see an area which had been mapped by the Survey of Kenya for purposes of land consolidation. In addition to observing the landscape the visitors heard a lecture explaining the survey techniques used and the results. The text of this lecture, explaining the type of work being done in the region, is presented in this report as Appendix I.

Hydrography:

Despite the recent impact of the sea in international affairs, and new discoveries of resources in the sea, the topic of Hydrography gave pause to but little interest and action beyond routine attention. A timely statement made by the United States challenged each African nation with a seacoast to recognize its heritage and assume full responsibility to develop hydrographic charts and to promote the field of oceanography for the exploitation of marine resources.

Representative for the International Hydrographic Bureau outlined the functions of his organization and spoke of its publications. He presented the smooth workings of the IHB as a model of international cooperation, implying that the ECA here had guidelines for its own success.

The Conference quite logically agreed that all maritime states should keep hydrographic information current for the benefit of all. Resolution No. 9 of the Conference (see page 20 of this report) gives the final results on this agenda item. It should be noted that the original draft of this Resolution was prepared by United States representatives in collaboration with the International Hydrographic Bureau and submitted by the United Arab Republic and Morocco.

Topical and Special Subject Mapping:

The problems of specialized topical mapping in Africa differ from those of more developed areas only in a matter of degree. With the large number of newly formed countries in Africa a more definite need has sprung to the fore for topographic base mapping upon which the results of special subject studies may be plotted. There is an understandable impatience on the part of those factions in any country needing the special maps to wait for routine base mapping. Nevertheless, realistic priorities must be established so that available mapping capacity of the young country can be most properly utilized in proper sequence.

As noted in connection with other topics, Africa comprises a landscape of stark contrasts. In some areas special-subject mapping has shown promising progress. In others one finds serious gaps in what should be considered as essential cartographic coverage. In communications to the Conference received from the French government may be noted many fine examples of topical mapping, including geology, botany, soils, vegetation, medicines and entomology. Geological and botanical studies have been superimposed on maps by various of the English-speaking states. As a striking isolated example, the United Arab Republic has accomplished notable soils mapping in the Nile Valley. In fact, scattered throughout the continent are impressive instances of special-subject maps, sometimes published but more often in preliminary or provisional form.

The Conference concluded that national committees should be formed to decide on priorities for all types of mapping and noted the need for standardization of symbols and legends to facilitate maximum understanding of the topical maps. It

was also brought out that cartographers should work closely with specialists in geology, agronomy, forestry, hydrology, and other sciences in the rendition of the results of their special studies. One additional--and very important--point was left unstated; namely that topical maps should be published and made available as promptly as possible to those that need them.

Map Preparation and Reproduction:

Discussion on the various aspects of map preparation and reproduction revolved around a number of documents presented to the Conference by the governments of France, United Kingdom, United States, United Arab Republic, and other countries. Since all of the African states are already progressing to some extent with the techniques to draw and produce maps, objectives of the Conference along these lines were to improve methods and smooth out any problems, such as those engendered by heat and high humidity.

The use of scribing techniques has already streamlined operations in map finishing and map reproduction by making possible the preparation of clear, accurate map copy without complications. Such techniques are well suited to the use of developing countries as they are easily learned, require relatively simple equipment, and do not require undue expense.

There was evidence in the discussions that the African countries have a real need to keep abreast of the commercial products now available and in the process of development. Stable plastic materials, special coatings and emulsions, stripping films, scribing devices, cartographic cameras and other supplies and equipment are being introduced by firms in Europe and North America and are available in Africa. Of special interest to the delegates was the potential offered by photographic composition machines for the proper placement and appearance of place names on maps. Again, many such types of apparatus are available.

Stress was placed on quality reproduction of maps so that valuable source data presented may be made available in accurate detail. Existing capabilities range from monochromatic reproduction to excellent multi-color printings. The methods used must be based on equipment available and on the competence of technical personnel. Substantial improvement in recent years was noted and more promised in the near future.

Geographical Names:

The subject of geographical names was included in the discussions as a special topic in Committee IV. Three countries--Kenya, France and Malagasy Republic--submitted papers specifically directed to the topic (Documents Nos. 6, 9, 35 as listed in Appendix II), while Ethiopia and France made reference to geographical names in more general reports (Documents Nos. 44 and 90).

At the request of Kenya and Liberia, the U.S. Observer who had chaired the ECOSOC Group of Experts on Geographical Names in 1960 was invited to comment on the background of the Experts Report E/3441 (1961) and on subsequent developments, including the revision of names specifications for the IMW at the ECOSOC Conference in Bonn a year ago and the proposal for an international conference now under consideration by the United Nations.

The only resolution on the subject was proposed by Kenya (No. 20). After minor editing by the Conference staff it was formally presented by Kenya and adopted with no votes against and with two abstentions. The resolution called on African countries to use the IMW specifications and apply them to maps on other scales as appropriate, to follow the recommendations of the Group of Experts in facilitating international use of the names as standardized nationally, and to participate in the proposed conference on geographical name standardization.

It was apparent from the discussions in and outside the conference sessions that in all the countries there is an awareness that geographic names pose difficult problems and a desire for their solution. The help of the names specialists will be welcomed. The fact that cartographers in many of the countries cannot wait for basic investigations in this field before bringing out maps emphasizes the importance of the proposed names conference in shortcutting the basic research time requirement. Even with this several countries may have to use the first editions of maps as a tool for eliciting the necessary information for more definitive second editions later.

National Atlases:

The central theme of the Committee's work on national atlases was to recommend their preparation by all African countries who have not yet prepared one. Attendant recommendations were: (1) to base the specifications and legends on

those standardized by international organizations; (2) to take into consideration similar projects by neighboring countries; and (3) to take into consideration later possibilities of incorporating the data in sub-regional (part of Africa) and Regional (all of Africa) atlases.

Objectives in accomplishing the production of individual maps of any national atlas are closely akin to those in special-subject maps. Atlas sheets, however, lend themselves to more extensive studies and potentially to international cooperation and projects.

East African countries have already published successful atlases which exhibit techniques comparable to those in European countries. Tanganyika, for example, has issued three editions and presently is planning a fourth revision. Kenya has already revised its atlas. Copies of these atlases were on exhibit for the Conference delegates to see. Cameroon, Sudan, and Morocco also have national atlas programs, the latter having been started in Rabat before the independence of that country, fashioned after the "Atlas de France." In a slightly different vein, an Atlas of West Africa is to be published in the near future.

OBJECTIVES AND THEIR ATTAINMENT

The objective of the United States Observer Delegation was to promote the United States National policy of peace and prosperity for all, believing that true peace is possible only through the recognition and guarantee of the basic humanity and dignity of all men, their freedom and security, and a decent standard of living for all.

To accomplish these somewhat idealistic aims necessitates a practical approach. Such an approach requires a knowledge of the basic national resources, both human and natural, possessed by the region. Once these resources are known with a fair degree of reliability, plans for their efficient utilization can be intelligently programed and set in motion. There must be two sets of plans--short range and long range--integrated together for a successful development program. Such a program of inventory and development of the resources is necessary for the economic development of the region and the welfare of the people.

Maps, charts and other cartographic products are vital to the successful inventory and resource development. These same maps and data are necessary for the security of individual property rights, to the security of an individual nation, and the collective security of the region. Maps, other cartographic material, and their proper use and interpretation are the basis for successful short and long range economic development planning, and for individual, collective and worldwide security and defense of freedom everywhere. As such, adequate and accessible cartographic intelligence on a worldwide scale is a necessary part of our national policy.

To support these broad objectives, several papers prepared by competent United States authorities were contributed to the Conference. These papers described in detail methods and procedures which have proven successful in our own cartographic operations. It was believed that a detailed description of these methods would contribute to the advancement of cartographic operations in Africa. These papers were supported with official and unofficial conferences and discussion. The United States position throughout was one of sincere friendship and helpfulness, and the discussion of mutual problems and means of solution.

In conclusion, the accomplishments of this First Regional Cartographic Conference for Africa exceeded my expectations and that of most observers. The seed was sown and the groundwork layed for future definitive action and cooperation of cartographic activities of the African nations attending this Conference. The proposed second conference in 1966 should provide the basis for assessment of accomplishment of a definitive nature and where outside assistance and guidance could be most profitably employed.

The contribution of the United States Observers was substantial and in good taste, both in the technical discussions and in personal contacts and sociability. I have nothing but the highest admiration and praise for the actions and accomplishments of the United States Observers and Advisors for a difficult job well done. It was a distinct pleasure to serve with them.

Report on
United Nations Regional Cartographic
Conference for Africa, Nairobi, July 1-13, 1963

APPENDIX I

The Role of Surveying and Mapping in a Land Consolidation Program

Text of a Speech Made by Mr. Aronson to Delegates and
Observers of the United Nations Regional Cartographic
Conference at the County Council Hall, Kiambu, on
Tuesday 9th July, 1963

NOTE: The following text is reproduced in this report because
it so well reflects the practical advantages of cartography
in its broad aspects toward resolving many of the economic
and social problems in the new countries of Africa.

In his opening address to the U. N. Cartographic Conference
for Africa, the Minister for Commerce and Industry, The Honorable
Dr. J. G. Kiiano, mentioned the important part the Survey of Kenya
had played in helping to carry out certain development projects
and, in particular, he mentioned land consolidation. I hope to
outline for you just what land consolidation was, what problems
it was designed to overcome and what methods were used to make
land consolidation work. I will also briefly describe the
benefits of registered title which is the end product of the
process.

The background must be described if the reasons for wanting
land consolidation are to be understood. First of all, and most
important, is the question of the ownership of land. By customary
law no individual person actually owned any land at all. At best,
an individual could be said to own a right to cultivate a piece
of land. This right was granted by the elders of the clan of
which the individual was a member. In some areas, notably Kiambu,
the individual's rights to cultivate had become so firmly
established that the rights of the clan had almost disappeared.
In other areas, such as Embu, the clan still retained a very
considerable control over which of their members could cultivate
which pieces of land.

Allied to this question of the right to cultivate was the
very serious problem of fragmentation. This arose by the working
of customary laws of marriage and inheritance.

At the same time, there was an ever growing number of disputes
over the boundaries of fragments as well as on the right to
cultivate.

All these matters combined to impair the agricultural economy
of the country and inhibit the improvement of the standard of
living.

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In order to overcome these problems, the project known as land consolidation was devised. The object of this project was to combine an individual's fragments into a single comparatively large plot, recognize his rights to cultivate that plot as amounting to full freehold ownership and to prepare a register which would identify both the owner and the plot of land. This would be a proper Register of Title which would allow full dealing with the land and the Title Register would be guaranteed by the government.

The first step was to adjudicate the ownership of each and every fragment of land and to measure the fragment at the same time. Boundaries of the fragments were frequently the subject of heated disputes and as often as not they relied on such ephemeral points as an old tree stump or a rock on the bank of a stream. Consequently, committees of elders were appointed in each sub-location and their job was to adjudicate the ownership and the boundaries of every fragment within the area of their jurisdiction. Attached to these committees were a number of land consolidation clerks and survey assistants whose job it was to record the decisions of the committee and to measure the boundaries of the fragments by chain. A diagram of the fragment was entered in a book together with the measurements and the approximate area was assessed.

It was at this stage where we made the first of a series of simple errors of judgment which were later to plague us with large numbers of complaints and accusations of dishonesty. If the fragments had been measured accurately by competent and well-trained survey assistants there would have been no later trouble but there would have been a quite considerable delay in completing the work of the adjudication committees. As it was considered essential to complete the work of adjudication as quickly as possible, the measuring of fragments was rushed through by inadequately trained staff without proper supervision. In their defense, let it be added that the ground was often steep and thickly wooded and there was not always cooperation from the rightholder. However, the mistake we made was to tell the rightholder the area of his fragments in terms of acres and we even went to the length of giving an area correct to two decimals. And all this when it was doubtful if the fragments had been measured correct to the nearest whole acre.

In any case, for each sub-location a record was prepared called a Record of Existing Rights which showed the name of each individual who had been adjudicated a rightholder and the number and size of his fragments. This Record also included details of plots which had previously been legally set apart

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for a public purpose such as a school, a market or a road and in yet a third part, details were shown of land required for new public purposes which had not yet been set apart. The Record was open for inspection for a period of two months and there was provision for an appeal against the decision of the committee. Thereafter, the Record was declared final and all questions of ownership of land were settled.

The next step was where the surveyors and map-makers came into their own. All the land in the sub-location was, so to speak, viewed as a single large unit. The public purpose plots were sited on a map of the sub-location, villages were sited and the smallest plots were sited round the villages. Roads of access were marked in and the larger plots fitted rather in the manner of a jigsaw puzzle. Wherever possible, individual plots were sited around the owner's largest or best developed former fragment. All this was done in the office on a map. When it was completed, the land consolidation teams went out onto the ground and attempted to demarcate the boundaries they had so carefully worked out in the office. Again the quality and training of the staff left much to be desired and speed was the top priority. All this resulted in numerous small errors and a few quite serious ones. I will return to this aspect later.

The boundaries, once demarcated, were planted with live hedges and at a given date, everyone moved onto his new plot of land.

At this stage a second register was prepared. This consisted of a document containing the individual owner's name, his plot number, details of the plot including its area to two decimal places, and the owner's signature saying he had been shown the boundaries of the new plot. The register also contained a map showing all the plots by number and was referred to as a base map. This was the map prepared in the office. When the hedges had grown, a further final map would be produced by air survey but more about that later. Again this register was open for inspection and objections to it could be lodged and were dealt with in the same way as appeals against the decisions of the adjudication committees. Provision was made for the payment of compensation to people who found they had lost some valuable development on an old fragment. This would be paid by the person who had become the owner of such development. Although there was a certain amount of grumbling, the advantages of a single plot with a title guaranteed by the government soon became apparent and dissatisfaction began to die down.

At the end of this second stage, a final Register of

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Title was prepared which was sacrosanct and could not be challenged in the Courts insofar as the first owner's right to own the land was concerned.

Now came the problem of making the final map. Air photographs were taken and maps prepared and then compared with the original base maps. The result at first sight was quite horrifying. Some plots were twice as big as they should have been; some were half their correct size; some had disappeared altogether; very few were even the correct shape that had been planned for them. In some areas there were beacons boundaries which had been the subject of a highly accurate cadastral survey and which bordered on plots surveyed by the land consolidation teams. Here there were encroachments and gaps; the railway reserve created some pretty little problems all of its own. Some boundaries never appeared on the photos at all and on investigation were found to have died if they had ever been planted. Acreages were sometimes ten per cent out and sometimes more.

You can imagine the reaction of the Survey of Kenya who were preparing these maps. Until now they had been used to dealing in terms of accuracy to an inch or two. I am very thankful to be able to say that they did not refuse to have anything further to do with land consolidation. It would have been understandable if they had. Instead, they buckled down and worked out plans on how to sort out all the numerous problems which were now highlighted. Without their invaluable help our land registration system would never have got going. As it is, I hope to give you some figures which will prove the success of consolidation in general and the final registration of title in particular.

You will naturally want to know how we overcame the problems I have just mentioned. Briefly, maps were prepared with all doubtful boundaries and other queries marked in red. Ground teams were sent out to investigate and where boundaries were missing, they were demarcated again and hedges were planted. When all the queries on a sheet were satisfactorily settled, it was reprinted and became the final registry map of the area. The question of false acreages was settled by pointing out to the complaining owner that no land was missing; it had merely been incorrectly measured in the first place. This has not been a very satisfactory answer particularly in the small number of serious cases of error which have cropped up. So there is provision for the payment of compensation in cases where the government is satisfied that the error is entirely the fault of its servants and is so great that the loss cannot be put down to a simple mis-measurement. There have been some cases of corruption which have slowed down the work but over all, the

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whole scheme is a tremendous success. In Kiambu District alone there are over 37,000 farm plots averaging some 4 acres. In the Central Region there are nearly 150,000 farm plots and almost as many village plots all mapped and numbered and the title to them registered.

I have purposely emphasized the errors that occurred in this scheme. My reason is that qualified surveyors do not normally make mistakes or, if they do, they are corrected when the work is checked and cross-checked. But in land consolidation the priority was on speed rather than absolute accuracy. And when you pause to consider that some half a million fragments in the Central Region alone were walked over, measured, adjudicated upon, disputed over and finally consolidated into proper plots with visible live boundaries and all this in only three years, then I think you will agree that it has been a magnificent achievement and the standards of accuracy overall do not detract from the project as a whole.

At this point I think it is time I mentioned the benefits conferred by registered title which provides the security of tenure.

Once title to land is registered the owner of the land immediately becomes possessed of an easily negotiable valuable document. There is no longer any doubt as to ownership of the land or whether the land is subject to incumbrances of any kind. The government guarantees the title and any loss resulting from an error in registration will be met by the government. As a result of becoming possessed of this valuable and negotiable title, the landowners have quickly realized that they can pledge their land as security for the repayment of a loan. Before registration this could not be done. Now, in the four years since registered titles were created in the African areas of Kenya, nearly a million pounds have been advanced on loan to some 5,000 individual landowners and this money has been used in the main for the development of those farms.

But registered title provides more than just security for a loan. It means that a landowner can sell his land easily without the purchaser forever being threatened with doubts about the seller being the proper owner. Furthermore, the landowner can lease his property which is virtually a new concept to African landowners and one which is only slowly revealing its value. Until now, markets were places where shabby little shops carried on a trickle of trade because no one could produce sufficient capital to put up a good building and to stock it properly. And if anyone did try to develop a market plot, there was a chance that the local authority would revoke his annual license or prejudice his position in some other fashion. Now, however, progressive

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local authorities of which Kiambu is the leader, are offering thirty-three-year leases containing development conditions of market plots and these are adequate to enable the trader to borrow working capital from the commercial banks and so to develop his plot and his business.

Of course all this novelty is not without its problems. A number of studies have been made into the effect of introducing advanced legal techniques into underdeveloped areas and it has been found that although the provision of a secure title is generally welcomed the attendant obligations placed on landowners are not so popular. It is quite clear that customary law dies hard and traditional attitudes towards land are often hampering the landowners themselves from making use of their registered title. It is all very well to be able to borrow money from the bank but it is frowned upon at the very least when a clan member sells his plot to a non-member. While it is appreciated that land cases are a thing of the past and that now a man can develop his plot without fear of inviting a succession of law suits from greedy relatives, there is still the tradition that each wife should have her own house and at least a garden to go with it. Furthermore, when a landowner dies, the custom has been for his sons to inherit his land more or less equally. Now, in order to prevent fragmentation taking place again, sub-divisions below a certain acreage are not permitted. This has tended to keep people away from the land registry when a landowner dies. Consequently, instead of having some two or three thousand deaths of landowners reported in the last 4 years we have only had about 300. This is a social problem rather than a legal one and it is hoped that an appreciation of the benefits of a registered title will overcome the traditional attitudes in time as has happened in Europe.

In the meantime, control of land transactions has been introduced and rests with committees of local people called Divisional Land Control Boards. These boards consider every transaction and can question the parties concerned. There is a right of appeal from any refusal of the Board to consent but, on the whole, this is seldom used. It is just becoming apparent to the local people that although you can borrow money from the bank on the security of your land, if you don't pay it back the chances are that you will lose your land. There have been a small number of cases where the Courts have ordered the attachment and sale of land owned by a judgment debtor and the reasons for the control of land transactions are very rapidly being appreciated and understood. However, control is in the hands of the people themselves and can be relaxed at any time. So there is a danger of land speculators appearing on the scene. But I think this too is understood and so far the common sense of the people has prevailed and control continues.

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And so that brings me back to where I started, the legal aspect of land ownership. As you have probably guessed by now, I am a lawyer and not a surveyor. Although the two professions tend to have different views of the same problem where land registration is concerned, we usually overcome our differences and I hope that the land consolidation and registration programs which are so much a part of one another in Kenya will become a monument to our past cooperation and a promise of cooperation between us in the future.

Report of the
United Nations Regional Cartographic
Conference for Africa, Nairobi, July 1-13, 1963

APPENDIX II

Documents Issued for the Conference
(in the E/CN.14/CART series)

NOTE: The checklist of 105 documents which follows includes all of the technical papers considered at the Conference, plus several routine items such as the agenda.

<u>No.</u>	<u>Source</u>	<u>Title</u>
1	Secretariat	Provisional agenda
2	Secretariat	General arrangements of immediate interest to the participants: Preliminary information
3	Secretariat	Provisional rules of procedure
4	Kenya	Report on cartographic activity in Kenya
5	Kenya	The application of photogrammetry to land consolidation in Kenya
6	Kenya	Geographical names in emergent multi-lingual countries
7	Kenya	Standard frequency transmissions in Kenya
8	France	Note on the methods used by France in producing the map of the countries of Black Africa in process of development
9	France	Note on the system of transcribing African toponyms for French-speaking African states south of the Sahara
10	France	Note on French topical cartography in Africa
11	France	Statistical record of the cartographic work carried out by the Institut géographique national français in the French speaking States of "Black" Africa and Madagascar. Republic of Guinea.

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<u>No.</u>	<u>Source</u>	<u>Title</u>
12	France	French participation in the botanic cartography of French speaking West Africa Annex: Work on Africa done by the Institut de la carte <u>internationale du tapis végétal</u>
13	France	Vegetation map. A problem of scientific Research.
14	France	Michelin road maps of Africa
15	France	Assistance given by the French cadastral survey department to African states
16	France	Aerial photographs and interim cartography on 1:1,000,000 scale. Specimens of maps.
17	France	Memorandum on international cooperation in compiling maps covering adjacent areas of several states
18	France	Note on the method used by the <u>Institut géographique national</u> in compiling the map of the Saharan regions on the scale 1:200,000
19	France	Memorandum on the precision levelling carried out by France in Africa
20	France	Memorandum on hydrographic surveys, sea charts and nautical information relating to French speaking countries in Africa
21	France	Memorandum on the printing of maps on "Retrovil" in France. Specimen of printing
22	France	Role of the cartographic service in the <u>Office de la recherche scientifique et technique outre-mer</u>
23	France	The contribution of ORSTOM medical and veterinary entomologists (1949-1962) to the African and Malagasy tropical map

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<u>No.</u>	<u>Source</u>	<u>Title</u>
24	France	Study and summary of the cartographic activities of ORSTOM in Africa
25	France	Geological map of Northwest Africa
26	France	Note by the Institut géographique national on the use of APR (Air Profile Recorder) flights above the equatorial forest
27	France	Memorandum on staff training
28	Ivory Coast	Organization of a geographical institute in the Ivory Coast
29	France	Presentation of the geophysical maps compiled by ORSTOM
30	Secretariat	International cooperation on cartography
31	Kenya	The development of surveying and photogrammetry as a university discipline in East Africa
32	Kenya	Territorial atlases. The production problem facing Survey Departments with limited resources
33	CCTA/CSA	International maps published by CCTA/CSA
34	Madagascar	Over-all adjustment of Madagascar's first order geodetic network
35	Madagascar	Toponymy in Madagascar
36	CCTA/CSA	International cooperation in cartography--the inter-Africa CCTA/CSA committee for the compilation of maps
37	Kenya	The history of geological mapping in Kenya
38	Secretariat	International cooperation of cartography--regional projects

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<u>No.</u>	<u>Source</u>	<u>Title</u>
39	Kenya	A method of producing new plates for Hohlux photo lettering machine
40	Tanganyika	Tanganyika technical services and mapping programme
41	Uganda	Report on cartographic activity in Uganda. Illustrations
42	Sudan	Major cadastral surveys for agricultural development in the Sudan
43	Sudan	Report on cartographic activities in the Sudan
44	Ethiopia	Report on cartographic activity in Ethiopia
45	France	Progress achieved in the mapping of African soils as a result of the investigations carried out by ORSTOM research workers
46	Tunisia	Report on cartographic work in Tunisia
47	United Kingdom	Report on cartographic activity in Africa
48	Congo (Leopoldville)	The current problem of general levelling in the Congo (Leopoldville)
49	Congo (Leopoldville)	Cartographic activities in the Congo (Leopoldville)
50	Secretariat	Information paper on the international map of the world on the millionth scale
51	Madagascar	Cartography on the scale 1:20,000 by altimetric checking of mosaics of a flat and partly wooded region
52	ICAO	Notes concerning aeronautical charts. Charts

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<u>No.</u>	<u>Source</u>	<u>Title</u>
53	Sierra Leone	Report on cartographic activities in Sierra Leone
54	Morocco	Cartography in Morocco
55	Sierra Leone	Map making in the geological survey, Sierra Leone
56	Secretariat	List of participants
57	Senegal	Memorandum on cartographic work in Senegal
58	Senegal	Memorandum on the contribution of amateur photography in the preparation of topographic documents
59	Senegal	Memorandum on the organization of topographical services in West Africa
60	United States	Hydrography and its importance to maritime safety and economic development
61	United States	Governmental responsibility for basic surveys and maps
62	United States	Benefits accruing from the exchange of cartographic source materials and technical information
63	United States	Recent scribing developments in map making
64	United States	Coastal geography and nautical charting
65	United States	Practical approaches to the establishment of geodetic control
66	United States	Measurement of distances over water
67	United States	International cooperation in surveying and mapping in the Americas

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<u>No.</u>	<u>Source</u>	<u>Title</u>
68	United States	Practical considerations for rapid mapping in developing countries
69	United States	The establishment of a national institute for aerial photography, cartography and geodesy
70	Germany, Rep. of	The orthoscope: an instrument for differential rectification
71	Secretariat	Annotated provisional agenda
72	United Arab Rep.	Review of cartographic activities in Egypt
73	United Arab Rep.	Development of map reproduction in the Survey of Egypt
74	United Arab Rep.	The contribution of aerial photography to the development projects in UAR
75	United Arab Rep.	Place of aerial surveying in the fulfilment of the cartographic programmes of the Survey of Egypt
76	Secretariat	Rules of procedure
77	United States	Maps as a basic requisite for economic development
78	United States	Bibliography of selected United States publications on surveying and mapping
79	United States	Aerial photo interpretation for the evaluation of vegetation and soil resources
80	Secretariat	Agenda
81	Liberia	Map reproduction
82	AAGS	Map compilation undertaken by the Association of African Geological Surveys
83	IHB	Adjustment of aerial triangulation

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<u>No.</u>	<u>Source</u>	<u>Title</u>
84	United States	Studying the land
85	United States	U.S. Engineers' geodetic surveys in Central Africa
86	United States	Catalogue of nautical charts and publications. Region 5 and Region 6
87	Ghana	Cartographic activities in Ghana
88	United States	Education and training for staffing surveying and mapping operations
89	United States	Modern techniques and instruments for surveys and mapping
90	France	Memorandum submitted by the Institut francais de l'Afrique Noire (French Institute for Black Africa)--Dakar--in connection with the International Atlas of West Africa
91	Secretariat	Provisional list of documents issued for the Conference
92	Morocco	Progress report on the compilation of the atlas of Morocco
93	Secretariat	List of Officers elected by the Conference
94	UNESCO	UNESCO activities in connection with topical mapping
95	U.S.S.R.	Rapid mapping of vast and incompletely explored territories on scales 1:100,000 - 1:300,000
96	United States	Report on scribing
97	United States	Color-separation scribing
98	Nigeria	Aerial survey in Nigeria: an application of new techniques
99		Draft Report

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<u>No.</u>	<u>Source</u>	<u>Title</u>
100		Report of Committee I
101		Report of Committee II
102		Resolutions adopted by the Conference
103		Report of Committee III
104		Report of Committee IV
105		Report of the Conference

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APPENDIX III

Exhibits

One feature of the Conference was the exhibition of maps and technical equipment. Many of the delegations had prepared exhibits to illustrate the status of their national mapping programs. In turn, several commercial aerial survey, instrument, and mapping concerns had booths with representatives standing by to explain their products and services.

The exhibit of the United States delegation was excellently conceived and created much favorable comment among the delegates. The Coast and Geodetic Survey, the Geological Survey, and various agencies of the Department of Defense participated in preparing the panels, with the U.S. Naval Oceanographic Office providing the coordination necessary to effect an integrated exhibit. At the close of the exhibition the United States panels were presented to the Survey of Kenya.

The following tabulation is a brief indication of map exhibits of the delegations, each one sketchily identified by an enumeration of the highlights of the display pannels. Following is a diagram which shows the arrangement of the Exhibition Hall and gives a number of the commercial exhibitors by location.

Exhibitors and Exhibits:

1. CONGO (Leopoldville)

Political and administrative maps
Aeronautical maps
Mosaics and mosaic control
Economic maps
Topographic sheets
Town plans
Large scale planimetric map of
Leopoldville

2. FRANCE

French maps of Africa issued by:
Service Hydrographique de la
Marine, Carte Aeronautique du
Monde, Institut Géographique
National, etc.

Maps of Cameroon, Central African
Republic, Comores, Congo
(Brazzaville), Chad, Algeria,
Dahomey, Gabon, Guinea, French

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2. FRANCE (Cont'd)

Somaliland, Ivory Coast,
Madagascar, Mali, Mauritania,
Niger, Réunion, Senegal, Togo,
Upper Volta

General maps, road maps, examples of
raised relief, topographic sheets
at various scales, gravimetric
maps, mosaics, city plans,
miscellaneous special subject maps
including ethnographic, vegetation,
soil, and political. Indices

3. GERMANY, Republic of

Photo maps by Aero Exploration
Aerial photography
Mosaic surveys
Examples of ground control
Photogrammetry and photogeology
exhibits
Mineral resources
Pipeline location
Topographic maps

4. GHANA

Road map
Topographic sheets
Special subjects maps
Town plans

5. KENYA (Survey Dept.)

Photos of mapping techniques
Development of maps at 1:50,000 scale
Examples of basic mapping
Revision techniques exhibit
Air photo coverage and air photography
Exhibit of specialized air survey
Example of 1:250,000 sheet
City map of Nairobi
Index of basic mapping coverage

6. KENYA (Dept. of Mines
and Geology)

Examples of geological maps at
1:125,000
Exhibit of geological booklets

7. MOROCCO

Examples of triangulation and leveling
Topographical maps at 1:500,000 scale
Soil maps
Examples of sheets at scales of
1:200,000, 1:100,000 and 1:50,000
Town plan of Rabat

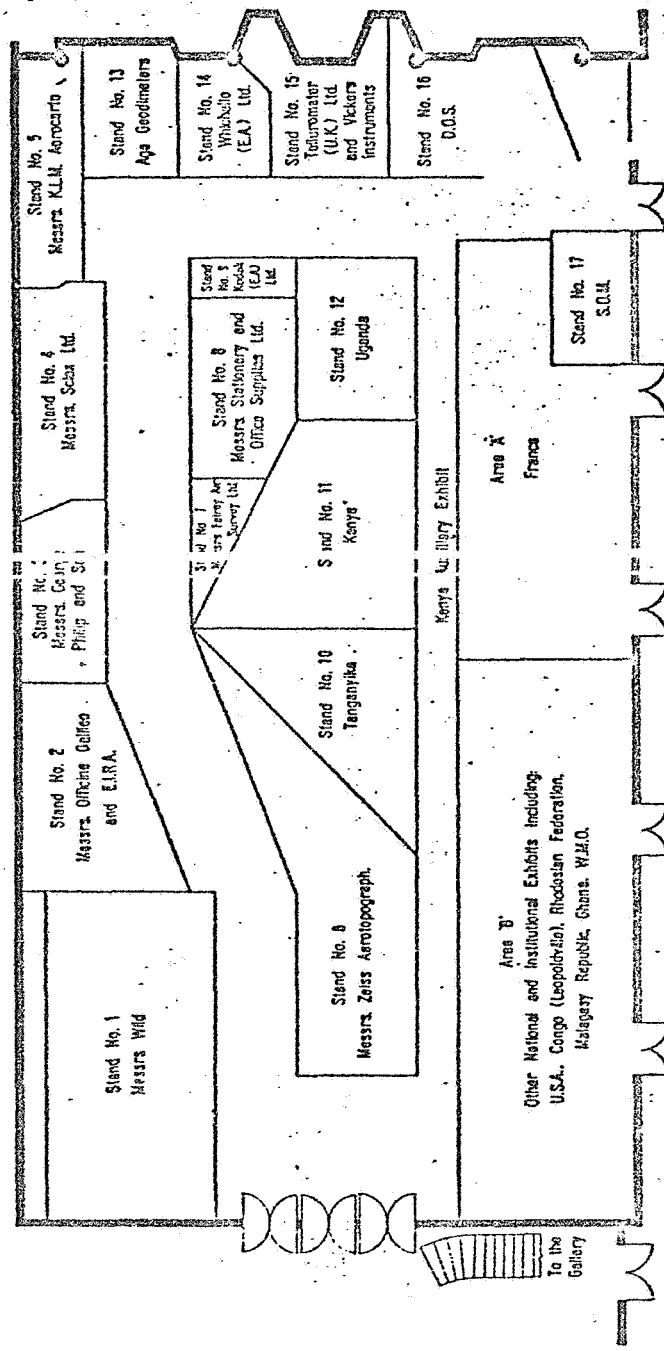
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8. FEDERATION OF RHODESIA
AND NYASALAND
Examples of large and medium scale maps
Town plans
Atlas sheets
9. SIERRA LEONE
Large scale topographic sheets
Political map of country
Atlas sheets
Town plans
Index
10. TANGANYIKA
Examples of sheets at 1:1,000,000,
1:500,000, 1:250,000, and 1:125,000
Road maps
District maps
Geological maps
Town plans
National Park map
Aerial photographs
Photos of map users
Indices
11. TUNISIA
Black and white topographic maps at a
scale of 1:200,000
Cadastral maps at a scale of 1:5,000
Examples of 1:50,000 sheets
Soil maps
Administrative map of country in Arabic
Index of topographic work
12. UGANDA
Atlas of Uganda
Examples of 1:250,000 sheets
Exhibit of 1:10,000 series
Wall map of Uganda
Map of National Parks
Special subject maps of soil,
vegetation, and geology
Town plans
13. UNITED KINGDOM (Direct-
orate of Overseas
Survey)
Exhibit of geodetic survey in East
Africa
Examples of 1:50,000 sheets of various
African countries
Example of sheet at scale of 1:1,000,000
Experimental 3d mapping
14. UNITED STATES
Exhibit panel showing scribing process
Examples of Aeronautical charts
Examples of nautical charts and
catalogues

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|--|---|
| 14. UNITED STATES (Cont'd) | Photoline and phototone process
Examples of shaded relief
Preparation of map bases
Charting with color photography
Airport obstruction charting
Modern instruments and techniques
Stereoscopic model of color photographs |
| 15. WORLD METEOROLOGICAL
ORGANIZATION | Rainfall map of East Africa
Meteorological charts of East African
areas |
| 16. UNITED KINGDOM--George
Philip & Son, Com-
mercial maps | Wide range of commercial maps on Africa,
including a selection of wall maps |

U.N. CARTOGRAPHIC EXHIBITION



Hold Further national and institutional Exhibits in the gallery